

## EARLY INDICATORS FOR ASSESSMENT OF RENAL DAMAGE

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### Introduction

The experiment was designed to define a good animal model for the study of drug-induced renal damage. In this experiment, the whole blood, serum, urine and kidney tissues were analysed for possible abnormalities during the development of kidney damage. The purpose was to determine the parameter (known or novel), which increases earliest in kidney damage. These changes were to be correlated with renal tissue lesions. The primary objective of this project was to determine the earliest serum parameter to show abnormalities in renal damage, to be used as an early indicator in the diagnosis of renal damage.

### Materials and Methods

Two experimental methods were used to induce renal damage in Sprague-Dawley rats. The first was conducted by single injections of puromycin aminonucleoside and the second by multiple injections of mercury chloride. All injections were done intraperitoneally. Tissue, whole blood, serum and urine samples were taken and analysed. Tissue samples were stained with H&E stain and analysed for microscopic changes. Complete blood counts were made on whole blood, and the biochemical parameters analysed on serum and urine samples. The parameters analysed were serum and urine creatinine, serum and urine proteins (biochemical and SDS-PAGE), blood urea nitrogen, and renal histopathology and tissue mercury content.

### Results and Discussion

A rat model was established as the experimental model for induced renal damage. The determination of the kidney functions tests showed that the most likely parameter to in-

crease earliest were the serum and urine albumin. The sensitivity of this parameter in the detection of renal damage was slightly superior to either the serum or the urine creatinine concentrations (Rasedee et al. 1998). However, these changes were complicated by a biphasic response in renal damage, that was approximately 14 days after the induction of damage and again about 14 days later (Rasedee et al. 1997). These represent two peak responses, which were interspersed with a low response. The tissue study also showed that one of the factors, which may have contributed to the known renal compensatory ability, is the epithelisation of renal tissue that follows soon after the appearance of damaged cells. Concurrently, serum protein detection was done through electrophoresis on nitrocellulose (SDS-PAGE). We observed an early appearance of a small molecular weight protein band in the rats, which developed renal damage. However, the appearance of the band was inconsistent, making separation and identification of the band difficult. At this point, a suitable early indicator is yet to be identified. The study has now shifted to urine parameters. Presently, the project is involved in the development of urine enzyme assays, which seems to show some potential as an early indicator to renal damage, particular renal tubular damage.

### Conclusions

In drug induced renal damage, renal tissue changes were biphasic. The study also suggested among the known kidney parameters, serum and urine albumin increase marginally earliest. However, this parameter may still not be suitable as an early indicator to renal damage. The answer to an early indicator of renal damage may lie in the urine enzyme concentrations.

### References

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